From: Aaron Nissen
To: Garry Christensen; Jerry Hintze
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Subject: U2 NOx Reduction (& testing)

Reducing U2 NOx Levels:

Discussion items from the NOx meeting with Operations, the Environmental Group and Engineering:

1) Lowering minimum threshold O2 levels from 2.5% (at control room) to 2.0% (but ensure we have 2.5% O2 at the backpass test grid)- Operations has requested that we test to verify O2 levels are 2.5% at the boiler backpass test grid when we are only reading 2.0% in the control room

Garry, Dave & Rob- please set up O2 grid on U2 backpass (test equipment needed- move from U1 over to U2 (and then move equip back to U1 when completed) tubing, bubblers, chillers, vacuum pumps, knockout bottles, desiccant filters, flow meters, dust filters, valving, O2 analyzers (2- east &west), DAS box & PC, table, calibration gas bottles, power supply, swamp cooler, cooling fan, etc..). Equipment setup and checkout will take roughly 3 days. Am hoping we can test on Thursday 8/7/03 (Bids need submitted).

U2 TEST SETUP- (not sure which pulv will be out)
900 MW gross
2.5% O2- determine O2 east & west averages at backpass
2.0% O2- determine O2 east & west averages

Other options that were discussed that will help reduce NOx levels:
2) using out of service pulv cooling air flow
pulv 2B (lower row) is suppose to be back this weekend from Maint
Any upper level pulv o/s will help reduce NOx levels by using o/s cooling air to reduce flame temp. Even 2nd and 3rd row levels (interstage cooling) effectively reduce flames temps.

3) Biasing in-service pulverizers (7 pulv operation)
Biasing the upper pulv levels by dropping coal flow down to 50% and biasing sec air flow up to 100% also simulates overfire air and cools the flame temp. This also lowers the fire ball lower in the furnace.

4) waterwall sootblowing
Keeping the waterwall as clean as possible helps reduce NOx by absorbing more heat and reduces flame temp. This also helps boiler perf by reducing Boiler Outlet Gas Temps

5) coal quality issues
Coal from WestRidge obviously, has a big impact on NOx, but so does Dugout Coal. We need to blend (or spreadout) ALL Dugout coal shipments across the active pile to minimize impact in the unit. Once the U2 scrubber modules have been modified for forced oxidation, U2 will be available to burn West

Ridge coal. Coal blending at this point becomes more critical. At the very least, we need to get a good consistent blend of 25% WR mix. However, (depending on achieved U2 NOx levels) we may need to consider not having coal sent to U2. This limitation would go until U2 Major Outage (March 2004) where overfire air and new burners will be installed.

6) 6 pulv operation
Taking an upper pulv completely o/s and having high cooling air flow simulates overfire or interstage cooling, plus lowers fire ball and helps reduce flame temps. Granted, this is assuming you have 6 reliable feeders to work with.

7) burner line balancing
As discussed, we are installing dynamic coal line restrictors on Unit 1 pulverizers over the next 4 to 5 weeks and will be balancing coal flows to each burner. Depending on the effectiveness of U1 test results, installing them on Unit 2 is certainly a cost effective option.

Unit 1 NOx targets (w/ overfire air)
The objective on U1 is to barely achieve target NOx levels. We still want to achieve CO targets and sale fly ash, as well. The most effective way is to run the OFA system at 10- 11% or 75% OFA 2/3 damper position (balancing all 4 OFA corners). Target O2 levels and o/s cooling air flow varies with the NOx target and coal quality changes. The same operation variables mentioned above, also come into play.

We are currently installing dynamic restrictors and will be balancing coal flows, plus adjusting registers to balance air flows. Then we will be repeating are test series (as required by Utah Air Qaulity).

CC: Blaine Ipson; Boyd Cowley; Dale Hurd; Dave Spence; Dennis Killian; James Nelson; Joe Duwel; Joe Hamblin; Jon Finlinson; Kelly Cloward; Ken Lebbon; Lynn Banks; Norman Mincer; Phil Hailes; Rand Crafts; Richard Schmit; Rob Jeffrey